DOCUMENT RESUME

ED 114 129 IR 002 768

AUTHOR Cieri, Marie Corse
TITLE The Electronic Blackboard.
PUB DATE May 74
NOTE 28p.; Partial fulfillment of course requirements of Teacher Education 554, Monmouth College

EDRS PRICE MF-$0.76 HC-$1.95 Plus Postage
DESCRIPTORS *Audiovisual Communication; *Chalkboards; Electronic Classrooms; Electronic Equipment; Facsimile Communication Systems; Facsimile Transmission; Higher Education; *Instructional Innovation; Instructional Materials; *Literature Reviews; Statistical Data; *Telecommunication
IDENTIFIERS Bell Laboratories; *Telewriting

ABSTRACT

A review discusses the background of the experimental electronic blackboard and its role as an audiovisual aid in instruction. Brief details of several systems are given: the Victor System, Electrowriter Remote Blackboard (VERB); Carbon County Wyoming Project; University of Tennessee Project; the Quebec Project in Canada; New York Institute of Technology (NYIT) Communication Linked Classroom; the University of Illinois VERB Project. Seventeen items are cited in a bibliography. The Bell Labs' electronic blackboard and a picture and information about the Victor System are appended. An eight-page statistical report on the Quebec project is attached. (DS)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED114129

THE ELECTRONIC BLACKBOARD

A Term Paper

Presented to

Dr. Aaron H. Schectman

Monmouth College

In Partial Fulfillment

of the Course Requirements of

Teacher Education 554

Modern Educational Practices

---

by

Marie Corse Cieri

May 1974

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

IR 000 768

TABLE OF CONTENTS

	Page
INTRODUCTION	1
BACKGROUND	1
BELL LABS' ELECTRONIC BLACKBOARD	2
THE VICTOR SYSTEM (VERB)	3
CARBON COUNTY, WYOMING PROJECT	4
UNIVERSITY OF TENNESSEE PROJECT	5
THE QUEBEC PROJECT	6
NYIT INSTALLATION	7
UNIVERSITY OF ILLINOIS VERB PROJECT	7
EVALUATION	9
CONCLUSION	10
PROJECTION	10
BIBLIOGRAPHY	12
APPENDIXES	13
A. Picture of Bell Labs' Electronic Blackboard	14
B. Picture of Victor System	15
C. Wisenthal Report	16

INTRODUCTION

The purpose of this paper is to report on the still experimental electronic blackboard and to evaluate its role as an audio-visual medium in instruction.

One of the first and oldest of the visual aids is a piece of chalk and a blackboard; there are times when the presentation of any subject can best be achieved by means of this medium.[1] So much a part of the classroom, the blackboard has become a symbol for education itself. Even in our space age, very often it is the best means for presenting concepts which are as new as today's scientific discoveries, so recent that the most convenient medium for presenting them is the blackboard.[2]

BACKGROUND

In this age of advanced technology the blackboard continues to serve as an indispensible part of teaching equipment. It is not known definitely when the blackboard first appeared on the educational scene; perhaps it is a modification of the waxen tablet of the Romans and the hornbook of the Middle Ages. One of the earliest printed references is a schoolbook published in 1497 in Basle, Switzerland, which depicts a wall-board on the title page.[3]

However, evidence of blackboard usage does not appear in American educational literatire until 1820.[4] Horace Mann is credited in great part with its introduction into American schools after he witnessed blackboard use in Europe, particularly on German schools.[5]

---

[1]Anna Curtis Chandler and Irene F. Cypher, Audio-Visual Techniques for Enrichment of the Curriculum (New York: Noble and Noble Publishers, Inc., 1948), p. 19.

[2]Walter Arno Witlick and Charles Francis Schuller, Audiovisual Materials Their Nature and Use (New York: Harper & Row, 1967), p. 73.

[3]James S. Kinder, Audio-Visual Materials and Techniques (New York: American Book Company, 1950), p. 75.

[4]Ibid., pp. 75-76.

[5]Harry C. Mckown and Alvin B. Roberts, Audio-Visual Aids to Instruction (New York: McGraw Hill Book Company, Inc., 1949), p. 128.

Mann emphasized its potential as a classroom tool in his writings for the Common School Journal. By 1823 the Report of the School Committee of Boston recommended the use of the blackboard, especially for mathematics. By 1824 it is recorded that a blackboard was introduced into the sophomore algebra class at Bowdoin College.[6]

Since that beginning various types of materials have been used in blackboard construction; wood painted or stained black, slate, composition board, cement mixtures and Masonite pressboard.[7] Today another dimension has been added. Modern technology has combined the blackboard with electronics.

BELL LAB'S ELECTRONIC BLACKBOARD

In December of 1972 five engineers in the telephone technology department of Bell Laboratories at Holmdel, New Jersey, were granted a patent for a telewriting system. The inventors of the device were C. Blake McDowell III, Leonard E. O'Boyle, William Levin, Fritz E. Froelich and George M. C. Fisher of the research and development unit of the Bell System. A message or lesson written on a blackboard was transmitted over regualr telephone lines for immediate reproduction on a TV screen at a distant location.[8]

In the earlier days of its development the writing instrument, whether chalk, pen, pencil or stylus, was equipped with a tiny location indicator which followed the writing on the "remote blackboard". Originally, a laser beam inscribed the identical inscription on a self-developing, photosensitive film for instant reproduction on the screen.[9] The laser operation is still under development.[10]

Presently the Bell electronic blackboard is being tested at the University of Illinois where it is being used to transmit engineering classes conducted at its campus in Champaign-Urbana to off-campus locations in Freeport, Rock Island, Peoria and Rockford.

---

[6]Kinder, op. cit., p. 76. [7]Kinder, pp. 76-77.

[8]The New York Times, December 23, 1972, pp. 33, 36.

[9]Ibid.

[10]Statement by Gabor Torok, personal interview, April 26, 1974.

Bell Labs and Illinois Bell Telephone Company are working in coordination with the University to conduct the technical aspects of the test.[11]

In these latest trials Bell engineers have altered the system. All information, whether handwriting, graphs or drawings, is transmitted when the instructor writes on a pressure-sensitive board with chalk, just as though he were writing on a regular blackboard. As in the original apparatus, the figures are electronically converted and transmitted over a telephone line; transmission may be across town or across country. At the receiving end, the signals are reconverted and displayed on a TV screen.[12]

A second telephone line carries the audio portion of a lecture by means of a portable conference telephone already on the market and in current use, primarily by commercial customers. Hands-free operation, a built-in loudspeaker, and two-way conversation between groups of people are the conference telephone features which make it ideal for remote teaching.[13]

Interestingly the entire transmission is audio-based for picture as well as sound. The only TV component is the receiving set used by the viewer.[14] (See Appendix A.)

THE VICTOR SYSTEM (VERB)

A variation on the electronic board and forerunner of the Bell device, predating it by about six years, is the product of the Victor Comptometer Corporation of Chicago, Illinois, and is called Victor's "Electrowriter Remote Blackboard", VERB. This system is not a blackboard, but the receiver becomes one when the transmitted image is projected on to a blackboard-like screen. However, the general principle and purpose are the same, allowing the indirect application of the subsequent VERB surveys to Bell Lab's endeavor,

---

[11] Bell Labs News, February 26, 1974, p. 1. [12] Ibid., p. 2.

[13] Torok, loc. cit. [14] Ibid.

for educational implications.

The VERB system utilizes a desk unit transmitter, 3½" x 5" with a 17½ square inch writing area upon which the instructor writes with an ordinary ball point pen. (See Appendix B.) (This transmitter unit functions in place of the chalk and board utilized in the Bell system.) The position of the pen on the writing surface produces a specific tone signal which is carried over regular telephone lines also, to an electrowriter receiver in the classroom where the pen moves to the same place as that on the transmitter. Everything the instructor writes is recorded on a celluloid tape on the receiver at the back of the room, which may be duplicated by an ordinary copying machine for class distribution. The images are projected on a screen which becomes the classroom blackboard. As in the Bell device, a second telephone line transmits voice communications which are fed to the class over a speaker in the room. The students speak over the system by using the push-to-talk telephone.[15]

CARBON COUNTY, WYOMING PROJECT

The Victor system was purchased by Carbon County, Wyoming school district in 1966 with a grant from the U. S. Office of Education under Title III, Elementary and Secondary Education Act to improve instruction in the county's six high schools and twenty-three elementary schools, involving an area of 7,965 square miles. A private two-line telephone system was installed for the operation by Mountain Bell.[16]

By the spring of 1969 the list of programs that were conducted through VERB in Carbon County included Spanish in the elementary schools, beginning with the third grade; spelling; math; telling time; science and art in elementary classes; a philosophy seminar for senior high school honor students; a special social studies series in Indian culture; guest lecturers on "Sociology -

---

[15]"Technology Bridges Tennessee's Hills," College Management, April 1968, p. 54.

[16]Carbon County Instructional Center, January 31, 1967, p. 1.

Moral Values," "Civics in the Classroom" and "Consumer Education in Schools." In 1968 high school English students took part in a discussion through a "VERBcast" with William Styron, author of the best seller, "The Confessions of Nat Turner." At a later time the same students interviewed Styron at a VERBcast" prior to his departure to the Far East.[17]

By the spring of 1969 teachers in Carbon County were taking credit courses via VERB from the University of Wyoming in physics, chemistry, education, history, geology and math. One teacher, Irene Trowbridge of Encampment, Wyoming expressed the involved teachers' attitude when she said, "..... It is especially helpful for teachers when it allows them to obtain credit while keeping up with their normal teaching duties."[18]

UNIVERSITY OF TENNESSEE PROJECT

The University of Tennessee at Knoxville also launched a VERB program which saved five hours driving time to and from classes at UT's graduate centers in Kingsport and Chattanooga. It was installed so that perfessors could serve the greatest number of students possible and eliminate commuting at the same time. Dr. Charles Webster, dean of the school of engineering and proponent of the remote teaching system, established a limit of 20 students to a class.

> We believe that larger classes in graduate programs dilute the effectiveness of an instructor.....On the other hand, you need a substantial number of students to make a class financially feasible. With a remote setup, you could have say 12 students on campus and eight or less in a different city. Without the remote hookup, small classes in other towns would not be practical.[19]

---

[17] Carbon County Instructional Center, May 23, 1969, pp. 1-3.

[18] Ibid., p. 4.

[19] "Technology Bridges Tennessee's Hills," College Management, April 1968, p. 55.

UT's school of engineering has a network of graduate and extension centers offering the full 36 hours toward a masters degree via VERB. The Chemstrand Division of Monsanto Company, at Decatur, Alabama uses the same system on Friday nights and Saturday mornings to teach electrical engineering to employees. The company boughts its own equipment and pays the telephone costs to tie into the University.[20]

THE QUEBEC PROJECT

VERB has also been installed by Bell Canada in sixty classrooms under the regional school commissions of Grand Portage, Pascal Tache, Orleans, de Tilly, de l'Amiante, Tardival, Iles-de-la-Madeleine, and of the Catholic School Commission of Quebec.[21]

Professor Michael Wisenthal of McGill University and a team of sociologists evaluated VERB for the Department of Education of the Province of Quebec. Data were accumulated on test and control groups at five normal schools in two different courses, measurement in education and statistics. Results indicated that there was no significant difference in both courses for the VERB and conventionally taught classes. Apparently physical presence of the professor was not essential in teaching these subjects. Better preparation on the part of the professors and the dialogue possible with VERB might explain the absence of difference in the final examinations.[22] (See Appendix C.)

---

[20]"Technology Bridges Tennessee's Hills," College Management, April 1968, p. 56.

[21]"'Blackboard by Wire' - That's VERB," Bell Service, Spring 1968, pp. 10-12.

[22]Michael Wisenthal, "Teaching by Telescript" (Province of Quebec: Department of Education, 1968), pp. 1-8.

NYIT INSTALLATION

In its Communications Linked Classroom, New York Institute of Technology at Old Westbury, Long Island, has incorporated a communication desk, separate from the individual study carrels, from which the student may converse with his teacher at an academic center, remote from the classroom. The desk contains a two-way hands-free telephone, a two-way telautograph (remotely operated pen) that serves as a "blackboard" on which the student and teacher may sketch and write while both observe simultaneously.[23] VERB is the system used at NYIT and is operating with reasonable success, but with limited student use.

Up until about a year ago the Institute was linked by telephone lines and VERB to the Signal School at Fort Monmouth, New Jersey. It was found in this case that the students did not use the system to any great degree.

UNIVERSITY OF ILLINOIS VERB PROJECT

VERB was utilized by the University Extension Network (UNIVEX NET) of the University of Illinois for five years to provide instructional programs to many areas in the state.[24]

In the fall of 1968 a systemic evaluation of this method of instruction was made at the University from an educational point of view. Factors examined were; final grades earned as compared to on-campus students, course evaluation questionaire by remote students compared to on-campus students, written comments from off-campus students and instructors using UNIVEX NET.[25]

Tho seventy-five students who commented on the remote instruction found the method satisfactory in general but would have preferred the teacher physically with them. The majority of complaints centered around mechanical equipment breakdowns and

---

[23] New York Institute of Technology, Communications Linked Classroom (Old Westbury, N.Y., 1974).

[24] Harold W. Wecke, "UNIVEX NET Instruction Equal to Conventional Ways, Study Shows," Statewide Campus, January 1970, p. 2.

[25] Ibid.

poor handwriting of teachers. Several students found fewer distractions and could concentrate better. Only one student disliked it so much that he was compelled to say he would never take another course presented this way while a number said they were looking forward to the next remote instruction.[26]

Responses from fourteen instructors showed a negative reaction to the small writing area, the limitation of one frame displayed material once it had been moved off screen, and the difficulty in drawing responses from students not physically present.[27]

On the positive side, about one-half admitted they had to prepare their material very carefully to fit the small writing area.[28]

However, the frustration of the small writing area aggravated by technical problems was sufficient for the University of Illinois to convert to the Bell Laboratory's electronic blackboard which is presently being tested at the University. One of the problems with the VERB installation was a mechanical one involving the rollers on the ball point pens when, frequently, the ink would dry out at pen point. Disturbances in transmission produced a "jiggling" reception in the image. The room also had to be dim in order to see the projected picture. However, it is important to note that the primary reason for the removal of VERB was the limitation of writing surface.[29]

From an educational point of view all the mentioned installations, nevertheless, show the need and value of such systems as VERB, as well as the still experimental Bell electronic blackboard. It remains to be seen if the latter proves to be a more efficient vehicle for the blackboard medium.

---

[26]Ibid. [27]Ibid. [28]Ibid.

[29]Statement by Gabor Torok, personal interview, April 26, 1974.

EVALUATION

From the foregoing references there seems to be sufficient evidence that the electronic blackboard could enrich curriculum from elementary through post graduate courses, including in-service training.[30] None-the-less, it is apparent that a great deal depends on careful preparation of the material used and appropriateness of the subject matter.

It would appear that this device would be a viable adjunct to a team teaching situation where the master teacher's speciality and expertise could be projected into small classrooms or into seminar groups. With the conference telephone in operation the instruction would be more individualized than is possible in a large lecture room or suditorium setup.

This device could be used to bring classroom instruction to bedridden or invalid students. Classes could be conducted "live" since transmission is instantaneous. In addition, entire lectures may be recorded on a standard stereo tape recorder and transmitted to a number of different classes meeting at various times and locations over regualr telephone lines. Both audio and graphics may be handled in this manner.[31]

As previously noted, the electronic blackboard has the capability for in-service training of teachers; nurses, para-professionals and students in remote areas could also be reached, bringing to them the kind of education that would otherwise be impossible for them to attain.

One might say that live instructional TV would serve the same purpose with the added feature of seeing the instructor in action. Howeve., the remote blackboard is far less expensive due

---

[30] "Technology Bridges Tennessee's Hills," College Management, April 1968, p. 54.

[31] Bell Labs News, February 26, 1974, p. 2.

to transmission over telephone lines instead of television channels.[32] In addition it does not require a professionally trained technician to operate.[33]

One may also champion the video cassette lesson which is comparatively inexpensive and convenient. It has its place in the classroom but it does lack the "live" character of the remote blackboard allowing for instant reaction via the accompanying conference telephone.

It is also in the area of cost that the electronic blackboard has an advantage over computer-assisted instruction. Here too the performing teacher is not "live".

CONCLUSION

All media have their advantages and disadvantages which is equally true of the electronic blackboard. Present research suggests that this system may eventually find increased exposure in education where it can fill a need because of its capabilities, facility of operation, simplicity of construction and low cost.

In the past, teachers have often failed to utilize appropriate media for the enrichment of classroom experence. The electronic blackboard has an "edge"; it starts with the familiar, a piece of chalk and a blackboard.

PROJECTION

Projection for the future might include a nationwide, and ultimately, a worldwide network of electronic blackboards linking institutions of learning to every corner of the earth, to industry, to government, making available what the experts can reduce to a blackboard. With this capability, from the University of California

---

[32] Torok, loc. cit.

[33] Bell Labs News, op. cit., p. 1.

at Berkeley, Glen T. Seaborg may demonstrate conversion of atomic energy for household use; from Paris, France, vacationing Salvatore Dali may illustrate sketching techniques, and in Moscow, Russia, Dimitri Shostakovich may lecture on counterpoint.

Herein lies the state of the art as it began, ------- with "a piece of chalk and a blackboard."

BIBLIOGRAPHY

Bell Labs News. Murray Hill, N.J., October 18, 1971.

Bell Labs News. Murray Hill, N.J., February 26, 1974.

"'Blackboard by Wire' - That's VERB," Bell Services, Spring 1968, pp. 10-12.

Carbon County Instructional Center. Sinclair, Wyoming, January 31, 1967, pp. 1-4.

Carbon County Instructional Center. Sinclair, Wyoming, January 31, 1968, pp. 1-4.

Carbon County Instructional Center. Sinclair, Wyoming, May 23, 1969, pp. 1-4.

Chandler, Anna Curtis and Irene F. Cypher. Audio-Visual Techniques for Enrichment of the Curriculum. New York: Noble and Noble Publishers, Inc., 1948.

Kinder, James S. Audio-Visual Materials and Techniques. New York: American Book Company, 1950.

McDowell, C. Blake III and L.E. O'Boyle. "Remote Blackboard System for the DDD Telephone Network" (Paper read at the IEEE Electronic Conference, Chicago, October 18, 19 & 20, 1971).

McKown, Harry C. and Alvin B. Roberts. Audio-Visual Aids to Instruction. New York: McGraw - Hill Book Company, Inc., 1949.

New York Institute of Technology. Communications Linked Classroom. Old Westbury, New York, 1974.

New York Times, December 23, 1972.

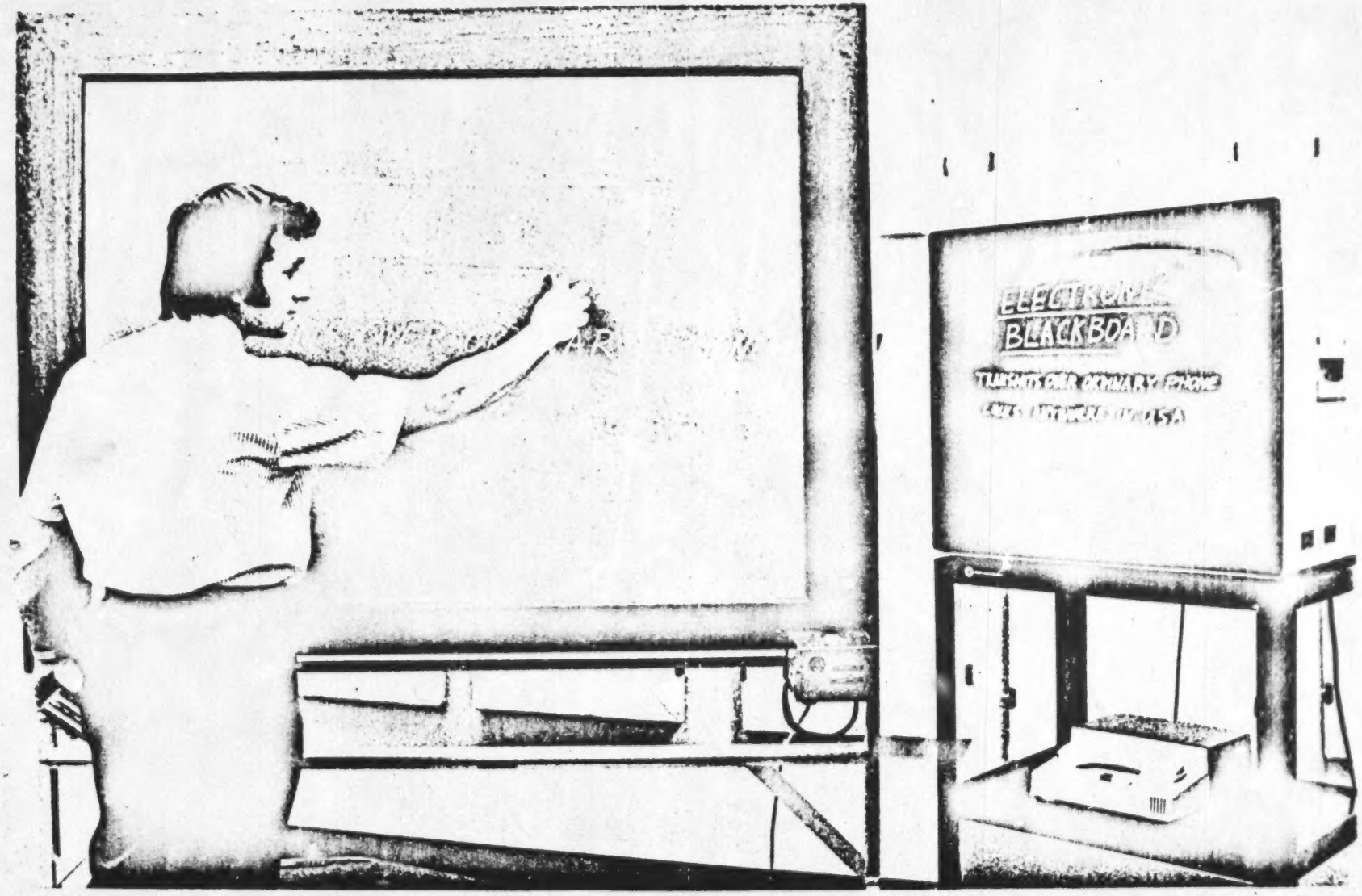
"Technology Bridges Tennessee Hills," College Management, April 1968.

Torok, Gabor. Personal Interview. April 26, 1974.

Wecke, Harold W. "UNIVEX NET Instruction Equal to Conventional Ways, Study Shows," Statewide Campus, January 1970.

Wisenthal, Michael. "Teaching by Telescript." Report for Department of Education of the Province of Quebec, 1968.

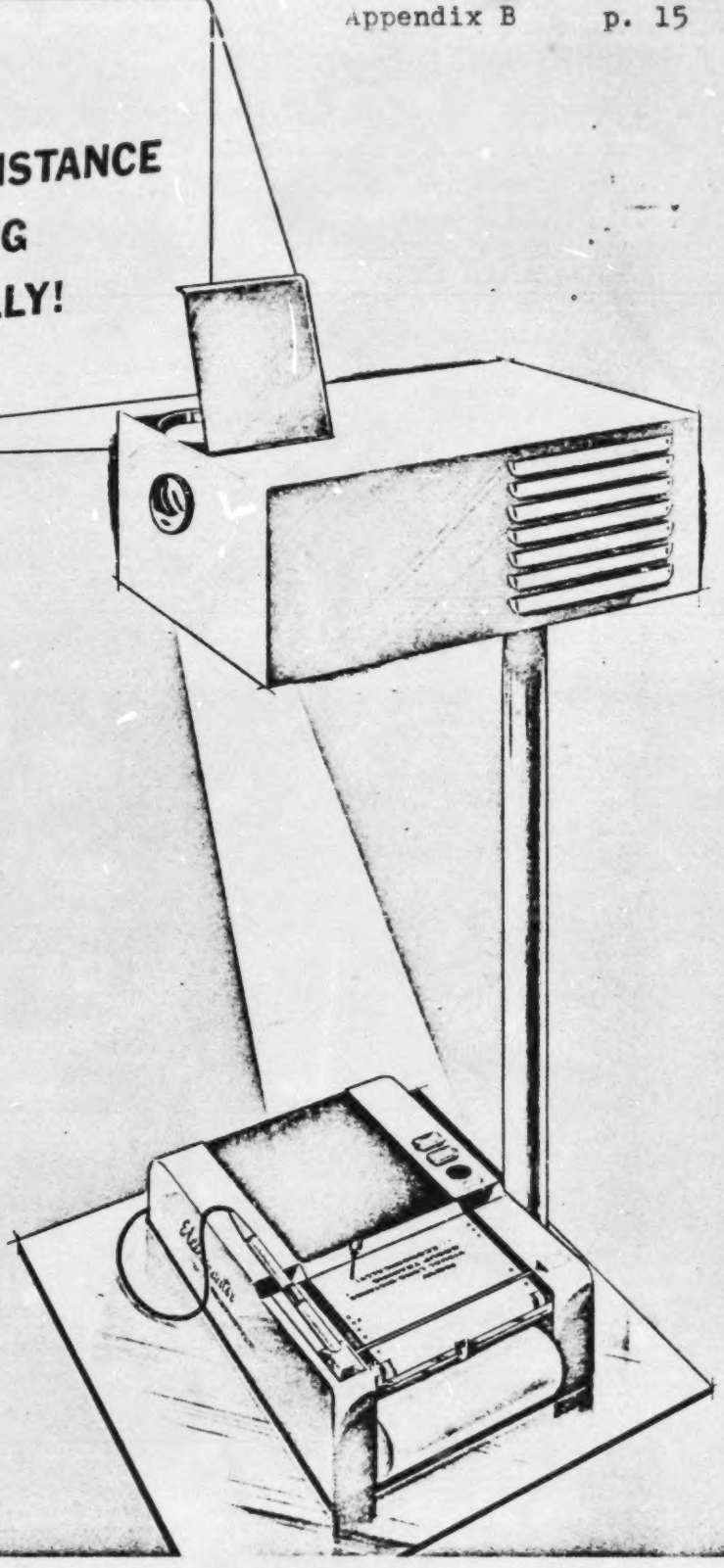
Wittlick, Walter Arno and Charles Francis Schuller, Audiovisual Materials Their Nature and Use. New York: Harper & Row, Publisher, 1967.



BLACKBOARD WRITING SENT OVER PHONE LINES – Gabe Torok of Bell Labs, Holmdel, N. J., demonstrates the electronic blackboard, a device that transmits blackboard writing over ordinary telephone lines for display on a TV screen at distant locations. The audio portion of a lecture is carried over a portable conference telephone shown here in the lower right corner under the TV monitor. The electronic blackboard is being used this semester by the University of Illinois to conduct off-campus classes.

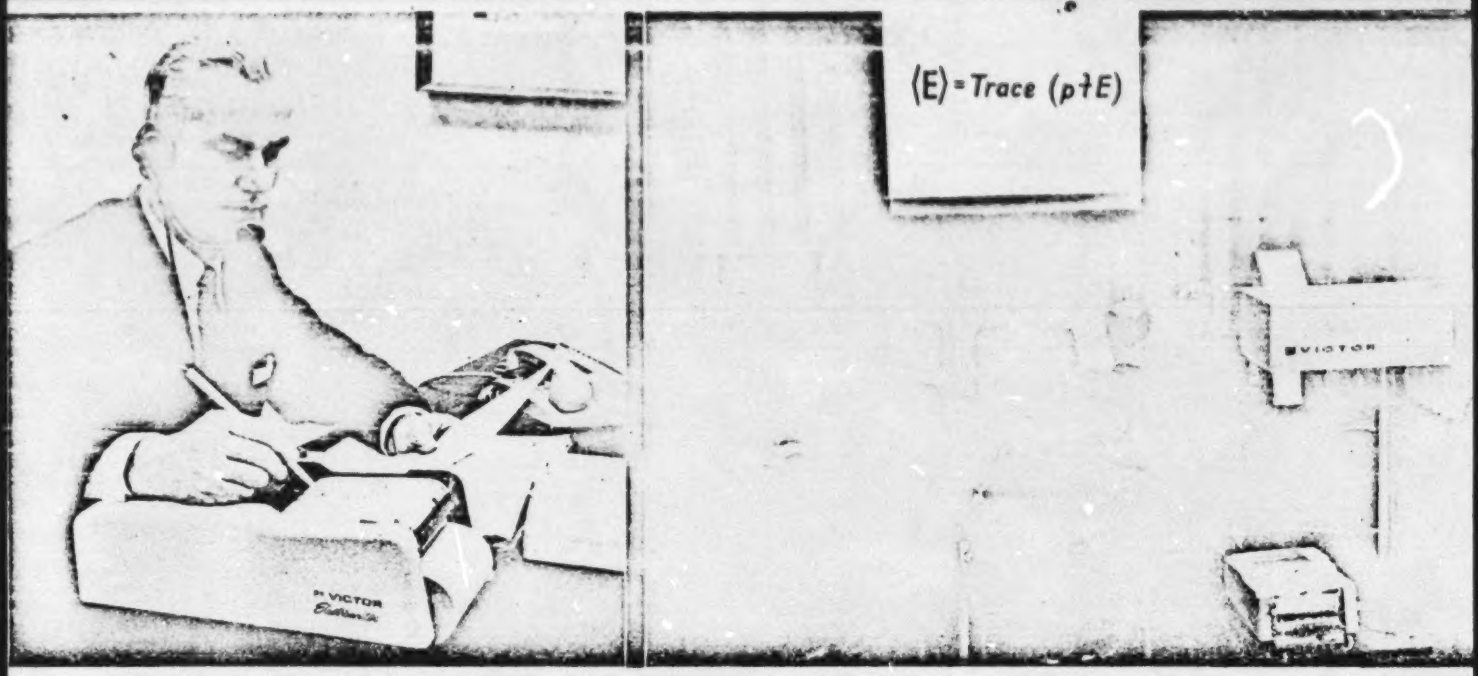
Photo No. 5.1.11–10 February 1974 Bell Laboratories

NOW
VISUAL LONG-DISTANCE GROUP TRAINING ...ECONOMICALLY!



VICTOR
Electrowriter®

REMOTE BLACKBOARD



Instructor lectures and transmits lecture notes from home or office—across town or across country—over regular telephone lines.

Training groups hear lecture and simultaneously view graphic material *as it is transmitted* to one or more classroom locations. System provides two-way exchange like any telephone call.

SPECIALIZED ▫ PERSONALIZED LONG DISTANCE TRAINING

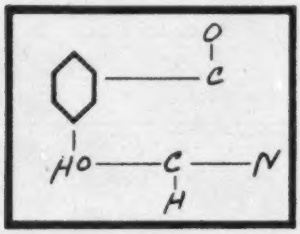
The Victor Electrowriter Remote Blackboard provides an effective and economical visual aid that enables you to utilize qualified lecturers or teachers who would not be available due to distance, travel time or the costs involved.

Although telephone lines provide for economical verbal group instruction by specialists at any distance, an adequate method of visual instruction has been missing. According to a recent university study it was pointed out that only 11% of material presented verbally is retained. Up to 80% is retained when there is a visual supplement to the lecture.

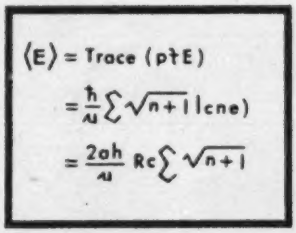
It is now possible to bring specialized graphic instruction to your classes with simultaneous verbal commentary at costs below other methods. Victor's *Electrowriter Blackboard* operates from any location, over any distance—to any number of individual groups. All handwritten notations, mathematical formulas, chemical annotations, drawings and graphs are enlarged to blackboard size or larger *as they are written* by the instructor. Students receive the double impact of both sight and sound.

With two-way telephone lines, students can question the lecturer. Instruction becomes personal and effective. Permanent written records of all the instructor's notes can be retained for additional viewing and "after class" discussion, and duplicated on any office copy machine for class distribution.

ANY DATA THAT CAN BE WRITTEN OR DRAWN CAN BE TRANSMITTED TO A VICTOR ELECTROWRITER BLACKBOARD

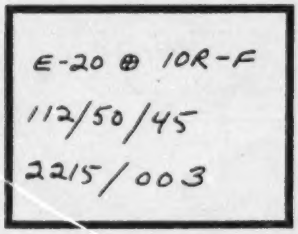


Chemical Annotations



Mathematical Formulas

Engineering Data



Weather Information

VISUAL GROUP TRAINING NOW AT MODEST COST

education

Add previously unavailable specialist instructors to your teaching faculty. This means enriching your curriculum from elementary through post graduate courses . . . including in-service training . . . all at a lower cost.

Take full advantage of your present faculty by transmitting lectures to regional campuses or participating schools—simultaneously. Eliminate instructor travel time and travel cost. Heighten student interest and enthusiasm with noted specialists. Graphic data viewed by students during class can be photocopied for later student reference. Notes are all in the instructor's original handwriting.

industry

Hold sales training meetings in home office and include all branches. As meeting is held all outlying branches simultaneously receive graphic information. Communication is immediate and as personal as a telephone call.

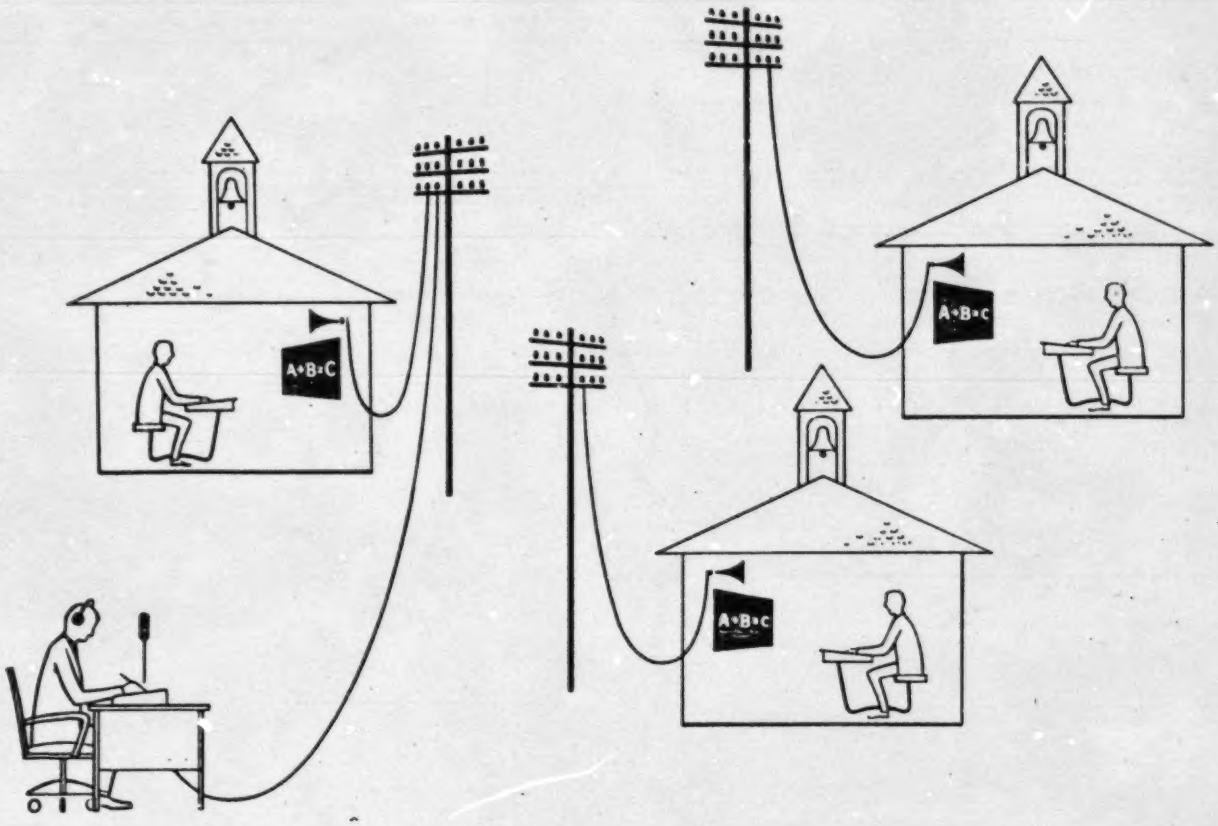
Conduct sales and service training classes. Introduce new selling approaches. Transmit charts, cost analyses, parts drawings and service techniques. Use the *Electrowriter Blackboard* as an attention getting device at conventions, sales meetings and trade association gatherings.

government

Hold group agency orientations and briefings from central headquarters. Provide instant group communications such as weather data and technical specifications. Add flexibility, heighten student interest in government retraining programs by establishing area-wide courses presented by noted specialists.

Offer self-improvement and college level courses to military personnel. Utilize academic instructors. Instruction takes place on military installation. No travel time involved for either personnel or instructor.

A TYPICAL VICTOR ELECTROWRITER REMOTE TEACHING SYSTEM



ABOUT VICTOR *Electrowriter* COMMUNICATION SYSTEMS

Now in use in business, industry and the government, Electrowriter instruments are utilized to instantly transmit and receive graphic data, sketches, information and authorizing signatures.

Transmission is accomplished by writing in a normal manner. As the message is written it is instantly and faithfully reproduced on one or more outlying receivers. Completely self contained, Electrowriter units operate over private wire, leased or company owned, as well as over local and long distance telephone networks. A normal 105-125 volts AC current supplies the needed power.

Regardless of distances involved, Electrowriter units will transmit to and receive from any number of stations.

VICTOR
VICTOR COMPTOMETER CORPORATION
BUSINESS MACHINES GROUP CHICAGO, ILLINOIS 60618
IN CANADA: VICTOR COMPTOMETER LIMITED • GALT, ONTARIO

Form No. 674-118-1 Printed in U.S.A.

TEACHING BY TELESCRIPT (1)

Introduction

The Quebec student population has always suffered from a lack of certificated and competent teachers. In the past 25 years the situation has become even more intolerable, the main reason for this being a large increase in the student population and the necessity to extend the education program.

To compensate for the lack of competent teachers, several means or types of teaching have been tried: educational television, educational radio programs, computerized education and others.

The use of these audio-visual techniques has been highly criticized because of its one-way communications; on the one hand, radio, television or films, on the other students in a classroom.

This new teaching method is composed of two types of communications equipment: a telescript which serves to transmit the texts by telephone as they are written; a remote blackboard connected to the telescript which permits the projection of information received by the telescript onto screen.

---

1) Bell Telephone Company of Canada equipment

According to the distance between the screen and the projector the dimensions of the projected picture can be increased to 8' x 14'.

The telescript is equipped with a circuit that transmits the professor's voice, and by means of "microphones or telephone hand-sets" carries the conversation between the students and teachers. The entire equipment used by the teacher is the following: a telescript receiver, a head-set or a speakerphone. The following devices are used in the class: a telescript receiver, a loudspeaker and telephone or microphone equipment is required.

While he gives his course by telephone, the teacher uses the telescript to communicate data, formulas or equations which are simultaneously transmitted to all classes. The data thus transmitted can be clearly read on the screen. During the class, the teacher can receive questions and comments from the students by an ordinary telephone line. The teacher's questions and answers can be heard by all.

Given that the teacher is not seen, would this education method be adequate if the students only hear the teacher's voice and only see the visual elements of the course?

Assumption

Students following a course by means of the telescript should not obtain lower grades than those following the same course using the traditional teaching methods.

Example

In October 1965, five normal schools in the Quebec area decided to take part in an experiment. It dealt with two different courses: measurement in education which deals with exams and psychology tests, and statistics.

Two professors, specialists in these fields agreed to use the telescript. Four colleges had each two third year "A" certificate classes. There were two types of groups involved in the experiment: a test group and a reference group. One school had only one class: the students were put in the test group.

Preliminary examination

To determine the standing of the groups at the beginning of the experiment a preliminary examination was given in each course. The following charts indicate the averages obtained by the different groups in each school, the difference between the test group's average and the reference group's average and the significance value of these differences.

CHART 1

Average obtained by the test and reference groups at the preliminary examination in Statistics.

Schools	Test N	Test Average	Reference N	Reference Average	Difference (test av.) (-ref. av.)	Significance
1	57	75.77	64	75.39	+ .38	N.S.
2	35	70.57	32	70.59	- .02	N.S.
3	21	83.20	27	82.90	+ .30	N.S.
4	22	66.55	25	69.00	- 2.45	N.S.
5	25	80.40	-	-	-	
Total:	180	75.03(s=11.70)	148	73.93(s=12.45)	+ 1.10	N.S.

The outcome was that the difference between the groups of the same school was minimum, save for school no. 4 where there was a 2.45 difference in favour of the reference group, but this difference is insiginficant. On the total there is a difference in favour of the test group but this difference is also insignificant. The differences between the schools are due to the fact that the courses were not started at the same time in all the schools. For example, the students in school no. 3 had acquired much greater knowledge of the subject than those in school no. 4. However these differences do not effect the experiment results.

Chart no. 2 gives the same data as chart no. 1 for the preliminary examination on Measurement in Education.

CHART 11

Averages obtained by the test and reference groups at the preliminary examination on Measures in Education

Schools	Test N	Test Average	Reference N	Reference Average	Difference (test av.) (-ref. av.)	Significance
1	63	44.05	54	39.39	+ 4.66	.05
2	31	47.06	32	28.18	+ 18.88	.001
3	21	51.43	21	55.71	- 4.28	N.S.
4	23	46.78	23	54.09	- 7.31	.02
5	23	50.82	-	-	-	
Total:	161	46.87(s=10.92)	130	42.23(s=15.66)	+.4.64	.01

Constancy and validity

It is evident that no comparison can be made between the two groups, if we accept that the examination has a constancy and a validity which can be used as standards of reliability. It is difficult to accept the test, if we consider the difference between the averages of the same school, as we note significant differences in the same subjects save in Statistics.

If we claim that the examination has the required qualifications of constancy and validity, it is obvious, when considering the averages obtained, that no comparison can be made between the test groups and reference groups. This assumption is no longer valid if we consider the varying averages in the same school. We can well ask ourselves why the differences between the groups' averages are not significant in Statistics and are significant in Measures in

The Statistics examination was set up using the items prepared by Thorndike and Hagen of Columbia; their items were standarized on numerous groups during many years, which was not the case for Measures in Education.

Description of the Experiment

The test groups were taught by means of the telescript equipment two hours a week over a nine-week period. Each of the two courses was given by one teacher to all the students in the test group. The reference groups were taught by their usual professor according to the traditional method. At school no. 1, the teachers who taught the test group by way of telescript equally taught the test group according to the traditional method.

Result

Examinations were given at the end of these courses. A certain number of the preliminary examination items were included in these examinations. The choice of the items was made according to a survey conducted by the McGill University Data Processing Centre.

CHART 111

Averages obtained by the test groups and the reference groups in the final Statistics examination

	Test (1)			Reference (2)			Difference		Significan
Schools	N	A	s	N	A	s	M(1) - M(2)	f	
1	56	73.52	13.65	61	74.45	10.85	- 0.93	.402	N.S.
2	30	83.17	9.60	36	80.33	9.85	+ 2.84	1.163	N.S.
3	21	79.38	11.70	27	82.74	9.40	- 3.36	1.050	N.S.
4	24	75.42	9.60	23	75.47	12.47	- 0.05	.015	N.S.
5	24	82.00	7.35	-		-	-		
Total:	155	77.74	11.95	147	77.57	11.15	+ 0.17	.127	N.S.

Chart no. 3 shows that differences in averages between the test groups and the reference groups in the final Statistics examination in each school and on the whole were not significant.

CHART 1V

Averages obtained by the test groups and the reference groups at the final examination in Measures in Education

	Test (1)			Reference (2)			Difference		Significanc
Schools	N	A	s	N	A	s	M(1) - M(2)	f	
1	62	69.58	13.55	57	71.91	12.33	- 2.33	.974	N.S.
2	32	75.43	12.08	33	74.12	12.06	+ 1.35	.652	N.S.
3	21	77.47	8.45	20	75.50	13.70	+ 1.97	.538	N.S.
4	23	66.13	13.72	24	65.12	12.20	+ 1.01	.261	N.S.
5	23	77.68	10.90	-	-	-	-	-	
Total:	161	72.47	13.35	134	71.77	12.90	+ .70	.457	N.S.

This chart indicates that the average difference at the final examination in Measures in Education were not significant.

Discussion

The fact that there was no significant difference in the examinations of the two subjects proves that the physical presence of the professor is not a must in teaching subjects such as Statistics and Measures in Education.

At the risk of hurting some teachers' professional pride, it seems reasonable to conclude that the face, appearance and other physical characteristics are less important in teaching that the excellence of the preparation and teaching of the course itself. Moreover, the fact that the teacher-student dialogue can be kept up explains the fact that no difference was evident in the final examinations. In other words, teaching by telescript is very similar to the traditional teaching method on the important points.

Conclusion

In the light of this first experimental study, it is possible to confirm the following assumption:

Teaching by telescript is as efficient as by the traditional method. Subsequent experiments should enable us to discover all the advantages of this new teaching technique.